A NEW COMBINATION IN *DIOCLEA* KUNTH (FABACEAE–DIOCLEINAE) FROM THE CLARIFICATION OF *D. GLABRA* BENTHAM, *FLORA BRASILIENSIS*[1]

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ABSTRACT

Comparing the *Dioclea glabra* collections cited by Bentham in *Flora Brasiliensis* in 1859, with the collections cited in his original descriptions of *D. glabra* and *D. coriacea* in 1837, reveals that the 1859 *D. glabra* collections include three species: *D. glabra* Benth. and *D. coriacea* Benth. (here lectotypified), and *D. scabra* (Rich.) Maxwell comb. nov. (here described and assigned a neotype). *Dioclea scabra* var. *brownii* and var. *schultzii*, both new varieties, are also described. The three species are placed in their appropriate sections.

In 1837 Bentham described 12 new species of *Dioclea*, including *D. glabra* and *D. coriacea*, and a new section, *Pachylobium* Bentham. Bentham's 1837 descriptions of *Dioclea glabra*, which he placed in sect. *Pachylobium*, and of *D. coriacea*, which he placed in sect. "*Eudioclea*" (sect. *Dioclea*), lacked descriptions of fruit characters.

When he described *Dioclea glabra* in *Flora Brasiliensis* in 1859, Bentham was able to include fruit characters from new collections. The 1859 description of *D. glabra*, however, contained elements of three separate taxa, *D. glabra*, *D. coriacea*, and *D. scabra*. He also moved *D. glabra* to his new sect. *Platylobium* Bentham and erroneously omitted *D. coriacea*.

My dissection of *Pohl 1578* (W), the lectotype of *Dioclea glabra* Benth. (1837), and study of Bentham's syntypes and other collections indicate that Bentham's original placement of *D. glabra* in sect. *Pachylobium* was correct, and that *D. coriacea* is in sect. *Platylobium* along with the new combination *D. scabra*. The invalidly published name *D. elliptica* Maxwell has been used in the literature (Kavanagh & Ferguson, 1981; van Roosmalen, 1985).

KEY TO VARIETIES OF *DIOCLEA SCABRA*

1a. Leaflets with primary lateral veins in 6–8(–10) pairs, upper lamina mostly smooth.
  2a. Flowers 2.3–3 cm long ..... 1a. var. *scabra*
  2b. Flowers ca. 2 cm long ..... 1b. var. *brownii*
1b. Leaflets with primary lateral veins in 10–12 pairs, upper lamina rugose ..... 1c. var. *schulzii*

I. Dioclea scabra (Rich.) Maxwell, comb. nov.
TYPE: Guyana: Essequibo, Pomeroon River, 17–24 Dec. 1922, *J. S. de la Cruz 3090* (neotype, UC; isoneotypes, F, MO, NY, US).
Dolichos scaber Rich., Actes Soc. Hist. Nat. Paris 1: 111. 1792.

1a. Dioclea scabra var. **scabra.** Figure 1.

Nonsynonymous names applied to this species.

Dioclea glabra auct. div.: Pulle, Enum. 233. 1906; Huber, Bol. Mus. Paraense Hist. Nat. 4: 407. 1909; Ducke, Arch. Jard. Bot. Rio de Janeiro 1: 42. 1915, 4: 95, 330. 1925; Amshoff, Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 52: 69,70. 1939(a), Flora of Surinam 2: 204. 1939(b); Pittier, Bol. Técn. Minist. Agric. 5: 79. 1944; Maguire, Bull. Torrey Bot. Club 75: 395. 1948; Ducke, Bol. Técn. Inst. Agron. N. 18: 220. 1949; Cowan, Mem. New York Bot. Gard. 10: 150, 151. 1958; non Benth. 1837.

Dioclea elliptica Maxwell var. *elliptica*, nom. inval., *The Genus Dioclea (Fabaceae) in the New World.* Doctoral Dissertation. Southern Illinois Univ., Carbondale, Illinois. 1969. TYPE: Guyana: Essequibo, Pomeroon River, 17–24 Dec. 1922, *J. S. de la Cruz 3090* (holotype, UC; isotypes, F, MO, NY, US).

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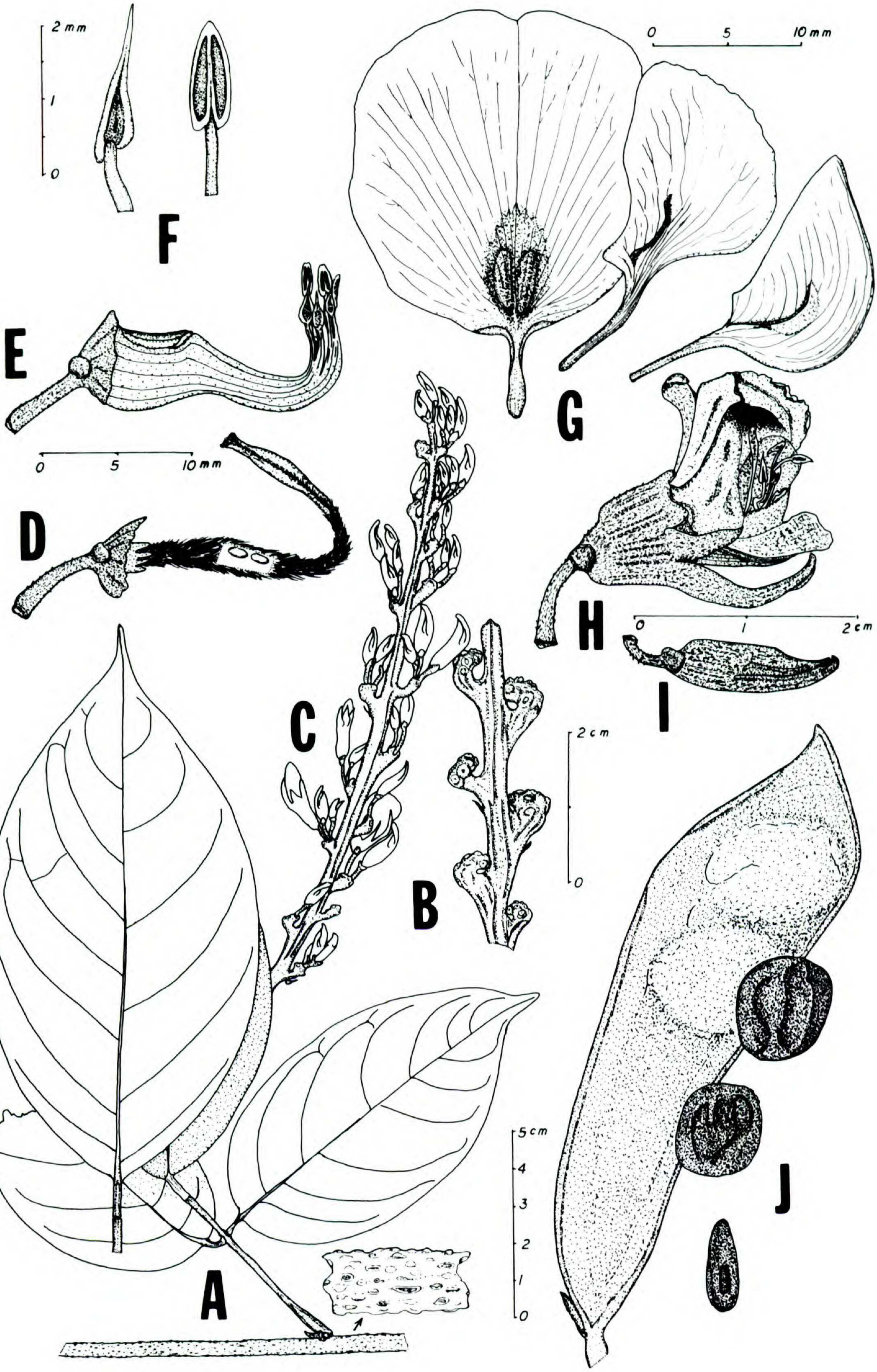
Lianas to 30 m tall, woody vines, or shrublets; stems terete, twining, occasionally with tendrils, usually glabrous, with raised, elliptic lenticels. *Leaves* trifoliate, the leaflets brittle or coriaceous, mostly elliptic, occasionally ovate or broadly lanceolate, 8–12(–24) × 4–9(–12) cm, the surfaces glabrous, the lower surface brownish, the apices mostly with elongate drip tips to ca. 2 cm long, the bases rounded, the primary lateral veins in 6–8(–10) pairs; petioles to ca. 10 cm long, the rachis ca. 2 cm long, both glabrous; stipules nonproduced, acute, to ca. 3 mm long, mostly persistent; stipels not seen, probably lacking. *Inflorescence* axillary, single, 20–50(–80) cm long, unbranched, ferruginous puberulent, becoming glabrate, flowering to ca. ½ its length, the rachis usually strongly angular, frequently with sections swollen and inhabited by ants; tubercles subsessile, the stalks stout, ascending, the heads incurved; bracts ovate, ca. 2 mm long, glabrous, semipersistent; bracteoles suborbicular to ovate, ca. 1.5 mm long, persistent. *Flowers* ca. 2.5 cm long, the pedicels 5–12 mm long, the calyx tube 7–12 mm long, sparsely ferruginous puberulent, the lobes 4, strongly upcurved, velutinous inside, the upper lobe obtuse, entire, ca. 6 × 10 mm, the lateral lobes falcate, acute to lanceolate, ca. 10 × 5 mm, the lower lobe lanceolate, ca. 12 mm long; standard reflexed, broadly oblong to somewhat orbicular, ca. 20 mm long with a claw ca. 5 mm long, entire or slightly emarginate apically, usually purple, lighter with age, bicallose, yellow or whitish in the center, somewhat carnose, glabrous; wings obliquely oblong to obovate, to ca. 15 × 10 mm with a claw 8 mm long; keels semiorbicular, to ca. 10 mm long with a claw 7 mm long, the upper margin basally auriculate, unlobed, the lower margin rising ca. 12 mm, culminating in a narrow or obtuse beak; stamens 10, pseudomonadelphous, the base of the vexillary free ca. 3 mm, mostly glabrous, the vexillary and inner alternate anthers of the staminal sheath imperfect, ca. 1.5 mm long, the 5 perfect anthers oblong, ca. 1.5–2.0 mm long; pistil geniculate or somewhat sigmoid, rising distally ca. 12 mm, the ovary ca. 7 mm long, short-stipitate, canescent villous, invariably 2-ovulate, the style with lower part hirsute, then swollen, somewhat triangular, narrowing to a flat, truncate apex, the upper part glabrous ca. 3.5 mm, the stigma subterminal. *Fruit* flat, twisting at dehiscence, dry, mostly obovate or oblanceolate, ca. 17 cm long, 2.2–3.0 cm wide basally to ca. 5 cm wide apically, the base rounded, the upper margin culminating in a short, downcurved beak, the exocarp mostly smooth, glabrate, the upper suture raised, with 2 close parallel ribs, the lower margin appearing flanged, 2-seeded; seeds flat, soft, dark, suborbicular, diameter 20–30 mm, 4–7 mm thick, the hilum oblong, 6–7 mm long.

Selected specimens examined. BRAZIL. AMAPÁ: Rio Oiapoque, *Irwin et al. 48038* (U, US); 2 km SE of Clevelândia, *Maguire et al. 47115* (NY, US). AMAZONAS: Rio Negro, between Manaus and São Gabriel, *Alencar et al. 358* (NY); *Black 48-2759* (NY, U, US, VEN); Manaus, *Chagas 356* (MG); 3 Feb. 1941, *Ducke 673* (F, MO, NY, SI, UC, US); 7 Dec. 1927, *Ducke RB 20423* (RB, S, U); Rio Cauaburi, *Holt & Blake 535* (K, NY, US); Rio Negro, *Kuhlmann 1030* (RB); Rio Negro, *Prance et al. 16007* (JEF, NY); Manaus, *Prance et al. 3178* (NY, S, US). PARÁ: Oriximiná, *Cid et al. 2469* (NY); Aramanahy, *da Costa 237* (F); Santarém, *Duarte 7231* (RB, SIU); Alto Tapajós, Missão Cururú, *Egler 825* (MG); Rio Arapiuns, *Pires & Silva 4394* (NY); Óbidos, Oct. 1850, *Spruce s.n.* (P), *Spruce 482* (P); Barra [= Manaus], June 1851, *Spruce 1643*[2] (P). FRENCH GUIANA: River Comté, *Aubréville 360* (US); Gourdonville, *Benoist 1514* (P); Cayenne, *L.C. Richard s.n.* (P); Sinnamary, route to Ste. Elie, *Sastre 6026* (US). GUYANA. ESSEQUIBO: Cuyuni River, *Aitken 1070* (S); Macouri Creek, *Archer 2487* (US); Essequibo River, *Atkinson 83* (BM); Kartabo, *Bailey 185* (GH); 4 mi. above Kaieteur Falls, *Cowan & Soderstrom 2090* (US); Pomeroon Dist., Pomeroon River, *de la Cruz 2972* (F, MO, NY, US); Potaro River at Tumatumari, *Gleason 330* (NY, US); Mazaruni River, *Jenman 625* (GOET, NY); Unabaruka Creek, *Martyn 223* (BRG, K); HMPS on Mazaruni Road, *Robertson & Austin 230* (MO); near Bartica, *Sandwith 129* (NY, RB). SURINAM: Toekoemoetoe Kreek, *Daniëls & Jonker 1336* (US); Kabalebo River, 20 km downstream from Kabalebo airstrip, *Florschütz & Maas 2589* (F, U); Lucie River, *Irwin et al. 55379* (F, GH, MO, NY, U, US, VEN); Saramacca River, *Maguire 24070* (F, U, US); *Pulle 203* (U); Lihanie River, *Rombouts 717* (NY, U); Lawa River, *Versteeg 274* (U); Upper Litanie River, *Versteeg 401* (U); Tapanahoni River, *Versteeg 662* (U). VENEZUELA. AMAZONAS: Cerro de La Neblina, Río Mawarinuma, *Anderson 13337* (NY); km 11 NE of San Carlos de Río Negro, *Davidse & Miller 26536* (MO, NY); 0 to 0.5 km SE of San Carlos de Río Negro, *Liesner 4019* (JEF, MO); Río Cunucunuma, *Maguire et al. 29498* (NY); Alto Orinoco, *Ll. Williams 15235* (F, VEN); forest of Orinoco, Esmeralda, *Ll. Williams 15510* (G, US, VEN); Casiquiare River, *Ll. Williams 15672* (F, US, VEN); Río Orinoco, frequent just above Tama-Tama, *Wurdack & Adderley 43113* (GH, NY, US, VEN). BOLÍVAR: Reserva Forestal Imataca, *Stergios et al. 2769* (PORT).

1b. Dioclea scabra var. **brownii** Maxwell, var. nov. TYPE: Venezuela. Territorio Federal Amazonas: Dept. Atabapo, SE bank of middle part of the Caño Yagua at Cucurital de Yagua, 8 May 1979, *Davidse et al. 17450* (holotype, MO; isotypes, MYF n.v., NY).

Flores ca. 2 cm longi; pedicellis ca. 4 mm longis; vexillo obovato-orbiculari, valde bicalloso; vexillari filo pubescenti ad basem. Legumen ignotum.

Leaflets elliptic, 9–12 × ca. 5 cm, both sides dull, glabrous; petioles and rachis glabrous. *Flowers*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to ca. 2 cm long, the pedicels ca. 4 mm long, the calyx tube ca. 6 mm long, the lobes slightly upcurved, the upper shallowly bifid or entire; standard obovate-orbicular, strongly reflexed, bicallose; anthers dimorphic, the base of the vexillary stamen pubescent; pistil deeply bent, almost sigmoid. *Fruit* unknown.

This variety shows some characters of *Dioclea ruddiae* Maxwell and *D. macrocarpa* Huber, but androecium and gynoecium characters are shared with *D. scabra*. I expect fruit and seed to be similar to var. *scabra* but smaller. Known from type locality only.

I am naming this variety after H. E. Brown, who realized that Bentham's *Dioclea glabra* of 1859 was not the same as Bentham's *D. glabra* of 1837. Brown wrote on an envelope affixed to *Gleason 330* [var. *scabra*] (NY), "This species = Jenman 625 [var. *scabra*] & 984 [n.v.] and unnumbered specimen of Schomburgk [n.v.] which have been named *Dioclea glabra* Benth. But (as I noted in the herbarium in 1880) it is quite distinct from Bentham's type of *D. glabra* and requires a new name."

1c. Dioclea scabra var. **schulzii** Maxwell, var. nov. TYPE: Guyana: Essequibo, Potaro, brown tough rope from crown of tree in Kakaralli clump Wallaba forest on red laterite soil, 7 Mar. 1949, *Atkinson 116* (holotype, BM; isotypes, NY, US). Record No. 6025, Forest Dept. No. 2878. ["D. B. Fanshawe" is on the NY sheet.]

Foliola elliptica, infra manifeste reticulata, glabrata, supra rugosissima, glabra, abrupte acuminatis apicibus ca. 2.5 cm longis, 10–12 venis; stipulis lanceolatis.

Leaflets elliptic, distinctly reticulate below becoming glabrate, strongly rugose above, glabrous, the apices abruptly acuminate, the drip tips about 2.5 cm long, the primary lateral veins in 10–12 pairs; stipules lanceolate, mostly exceeding 6 mm.

Known from the type locality only. Named after J.P. Schulz (Dienst's Lands Bosbeheer, Surinam (1968)). This variety is similar in flower characters (and I assume fruit) to var. *scabra*.

DISCUSSION AND LECTOTYPIFICATIONS

Bentham's new sect. *Pachylobium* of 1837 included *Dioclea glabra* Benth., which is lectotypified here.

Dioclea glabra Benth., Comm. Legum. Gen.: 69. 1837. TYPE: Brazil. Goiás (?): ad San Izidro, *Pohl 1578* (lectotype, W, photo at M, F neg. no. 32009); ad San Izidro, *Pohl s.n.* (isolectotype? K, photo F, photo S of questionable isolectotype at K, NY photo neg. series 2479).

Of the syntypes cited by Bentham, I believe "Ad San Izidro" *Pohl s.n.* is *Pohl 1578* (W) and the collection number was added later. I selected *Pohl 1578* (W) as lectotype because of notations (especially concerning localities) on the herbarium sheets, the preservation of Bentham's original intent in 1837 as to section placement and description, and the type photos in current usage.

My dissection of *Pohl 1578* (W), the lectotype of *Dioclea glabra* Benth. (1837), revealed 8–9 ovules and calyx characters that do not fit Bentham's sect. *Platylobium*. Study of *D. glabra* seed characters, especially the linear, half-encircling hilum, indicates the original placement in sect. *Pachylobium* was correct. In 1859 Bentham described sect. *Pachylobium* as having 2–3 (rarely 4) ovules. I believe the number of ovules in this section is much more variable.

Bentham's 1837 sect. "*Eudioclea*" [sect. *Dioclea*] included *Dioclea coriacea* Benth., which is lectotypified here.

Dioclea coriacea Benth., Comm. Legum. Gen. 69. 1837. TYPE: Brazil. Amazonas: Goiás: Congo do Padre, *Pohl 1996* (lectotype, W); Congo do Padre, Herb. Mus. Vind. 1837, *Pohl s.n.* (isolectotypes?, K, NY, photo of NY specimen at S, photo of K specimen at US, NY photo neg. series 2480).

Of the syntypes cited by Bentham, I believe the "Congo do Padre" *Pohl s.n.* is *Pohl 1996* (W). I selected *Pohl 1996* (W) as lectotype because no-

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FIGURE 1. *Dioclea scabra* var. *scabra*.—A. Leaflets, part of stem (*Prance et al. 16007*, JEF).—B. Inflorescence rachis section with tubercles and bracts (*Prance et al. 16007*, JEF).—C. Inflorescence section (*Liesner 4019*, MO).—D. Pistil showing ovule positions (*Prance et al. 3178*, S).—E. Staminal sheath with pseudomonadelphous stamens (*Wurdack & Adderley 43113*, VEN).—F. Dimorphic anthers (*Wurdack & Adderley 43113*, VEN).—G. Petals: standard, wing, and keel (*Wurdack & Adderley 43113*, VEN).—H. Flower (*Irwin et al. 55379*, VEN).—I. Flower bud (*Irwin et al. 55379*, VEN).—J. Fruit, 2-seeded (*Ll. Williams 15672*, VEN); seeds (*Ducke, 7-12-1927, RB No. 20423*, RB).

tations (including "tipse") on the herbarium sheet, and the accurate type photos of the presumed isolectotype at K.

I believe Bentham's other *Dioclea coriacea* syntypes (1837) included heterogeneous elements, which I have determined as follows: Ega Amazonum, *Pöppig* [= *Pöppig 2886*] (paratype? W, 3 sheets with very immature inflorescences = *D. coriacea* or *D. macrocarpa* Huber?); In margine sylvarum prope Para, *Martius* [= *Martius 2716*] (M) = *D. glabra* sensu Bentham (1837).

Bentham's 1859 description of *Dioclea glabra* in *Flora Brasiliensis* is based on the following collections: "Habitat in silvis prov. Paraënsis, Piauhiensis et do Alto Amazonas: M[artius], Spruce: in prov. Pernambucensi: *Gardner n. 2823.*; in prov. Goyazensi: Pohl; et in prov. Mato Grosso secus flumen Paraguay: Weddell." I have sorted out these *Flora Brasiliensis* collections into three separate taxa as follows. The *Martius* collections (M) are paratypes of *D. glabra* (1837). The *Spruce* collections, Barra do Rio Negro, June 1851, *Spruce 1643*[2] (P); Óbidos, *Spruce s.n.* (P) are *D. scabra*. *Spruce 1139* (M), San Gabriel da Cachoeira, Rio Negro, Jan., Aug. 1852, is *D. glabra*? Of the *Spruce* collections from between Santarém and Barra do Rio Negro, Oct. 1850, *Spruce s.n.* (W) is *D. coriacea*; Oct. 1850, *Spruce 1190* (M) is *D. glabra* (1837). *Gardner 2823* (BM, K) is *D. coriacea*. The *Weddell* collections from Paraguay R., *Weddell 3269* (F, P); April–May 1845, *Weddell 3269* (P), 1848, *Weddell 3269* (P) are all *D. glabra* Benth., sensu 1837. Again, I believe the number "3269" was added later.

Bentham's 1859 citation "in prov. Goyazensi: *Pohl*;" is I believe "ad S. Izidro" *Pohl 1578* (W), the lectotype of *Dioclea glabra* Benth. (1837). The other "ad S. Izidro; *Pohl*" citation in *Flora Brasiliensis* is *Dioclea latifolia* Benth., but the type is unequivocal as Bentham (1837) cited only one collection, *Pohl 1565* (K, W). Pohl's itinerary included "Corgo (*sic*) do Padre" in Goiás, according to Urban (1906), and it is possible Bentham included the lectotype of *D. coriacea* (1837) among the collections under *D. glabra* (1859), although *D. coriacea* was not cited in synonymy.

Bentham (1859) also gave a northern distribution for *Dioclea glabra*, "Crescit etiam in Guyana anglica et gallica." However, *D. glabra*, sensu 1837, has never been found in Guyana or French Guiana; this part of Bentham's distribution refers to *D. scabra*.

Pulle (1906) followed the concept of *Dioclea glabra* as used in the *Flora Brasiliensis*. Huber (1909) noted discrepancies between specimens determined *D. glabra* and Bentham's description in *Flora Brasiliensis*. Work by Ducke (1915, 1925a, b) on the Amazonian flora established the concept of *D. glabra* in sect. *Platylobium* rather than sect. *Pachylobium*, at least in the New World. Ducke described *D. leiophylla* in sect. *Pachylobium* in 1925a, and I (1969) placed that binomial in synonymy under *D. glabra* Benth., sensu Bentham (1837); this treatment was followed by Lewis (1987). Pittier (1944) also noted that Bentham's 1859 calyx and fruit description of *D. glabra* did not match the common *D. glabra* (= *D. scabra*) of Esmeralda, Alto Orinoco, Venezuela. *Dioclea coriacea* Benth. became lost in Ducke's (1925, 1949) "forms" of *D. glabra* and *D. bicolor* Benth.

Amshoff (1939a) cited Richard's description (1792) of *Dolichos scaber* and noted, "When this is really a *Dioclea* species, the description agrees very well with *D. glabra* Benth." This was *D. glabra* Benth., sensu 1859 (= *D. scabra*).

Amshoff (1939a) further stated that no specimens determined *Dolichos scaber* could be traced in the Paris herbarium. Amshoff (1939b) in Pulle's *Flora of Surinam* added under *Dioclea glabra*, "— vs. *Dolichos scaber* . . ." indicating she might have seen dried specimens.

New species described by L. C. Richard (1792) were based on specimens collected by Leblond in Cayenne and are now housed at G according to Stafleu & Cowan (1983). A search for the type of *Dolichos scaber* was undertaken by Dr. A. Charpin at Geneva. A holotype was not found in G and G-DC collections. Article 37 of the *International Code of Botanical Nomenclature* (1988) states citation of a type is not necessary prior to 1958. However, since no types have been found and Richard's description (1792) was extremely brief, I have selected *J. S. de la Cruz 3090* as the neotype.

I have taken up the epithet *scabra* as a valid name and have placed *Dioclea elliptica* in synonymy.

The three taxa, *Dioclea glabra*, *D. coriacea*, and *D. scabra*, more or less share Bentham's description of small, nonproduced (probably lacking in *D. glabra*) stipules, an overall glabrous aspect, as well as ovate or elliptic, coriaceous leaflets. However, *D. glabra* Benth. (1837) is a sizable liana distributed throughout the southern Amazonian region of Brazil and farther south along the rivers and gallery forests into the planalto and Mato Grosso. It is often collected. The fruit was illustrated by Ducke (1925a, pl. 5) as *D. leiophylla*.

Dioclea scabra, the northernmost element of sect. *Platylobium*, is found in Amazonas and Bo-

lívar of the Venezuelan Guayana, the Guianas, and in Amapá, Pará, and Amazonas in Brazil. *Dioclea coriacea* is sympatric with *D. scabra* to the north, but extends farther south in Brazil into the planalto and campos. Both grow as vines or shrublets.

Dioclea scabra differs from *D. coriacea* by possessing a stout, ridged peduncle and rachis, ascending stout tubercles, larger flowers, sharply upturned calyx lobes, the lower lobe tip hooked or cupped over the upper lobe in the bud, standard broadly oblong to somewhat orbicular, and larger fruit.

In contrast, *Dioclea coriacea* has a slender inflorescence, long-stalked tubercles extending out from the rachis, smaller flowers, the largest to ca. 2.3 cm long, calyx lobes somewhat straight or the lower lobe upturned, standard mostly obovate, and smaller fruit, the largest to ca. 12 cm long, 3 cm wide basally to ca. 4 cm wide apically.

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